CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
850 Marina Bay Parkway, Richmond, CA 94804

ENVIRONMENTAL MANAGEMENT BRANCH
Marine Biotoxin Monitoring Program

Monthly Marine Biotoxin Report

October 2011

Technical Report No. 11-24

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of October, 2011. Ranges of toxin concentrations are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA). Estimates are also provided for the distribution and relative abundance of *Alexandrium*, the dinoflagellate that produces PSP toxins, and *Pseudo-nitzschia*, the diatom that produces domoic acid. Summary information is also provided for any quarantine or health advisory that was in effect during the reporting period.

Please note the following conventions for the phytoplankton and shellfish biotoxin distribution maps: (i) All estimates for phytoplankton relative abundance are qualitative, based on sampling effort and percent composition; (ii) All toxin data are for mussel samples, unless otherwise noted; (iii) All samples are assayed for PSP toxins; DA analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA); (iv) Please refer to the appropriate figure key for an explanation of the symbols used on the maps.

Southern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed in very low numbers at several sites in October (Figure 1). PSP toxins were not detected in any shellfish samples this month (Figure 3).

Domoic Acid

Pseudo-nitzschia was observed along the entire southern California coast in October

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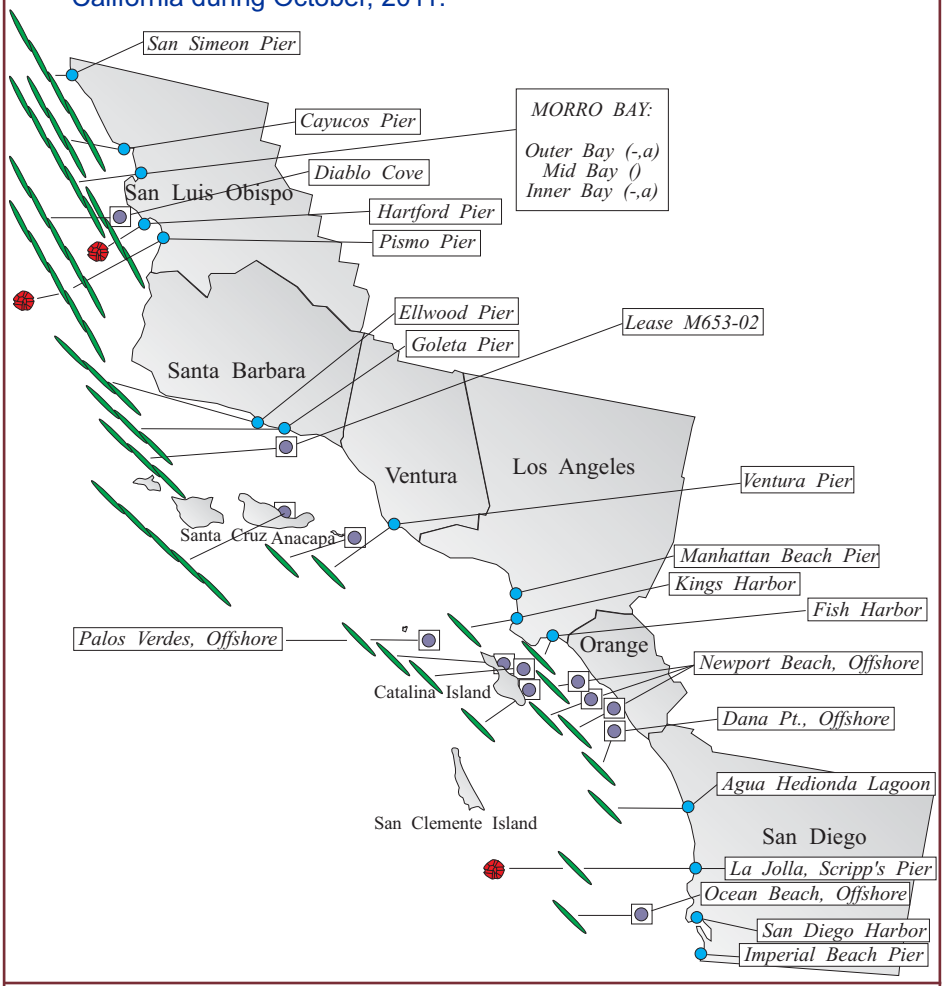
Figure 1. Distribution of toxin-producing phytoplankton in Southern California during October, 2011.



Relative Abundance of Known Toxin Producers

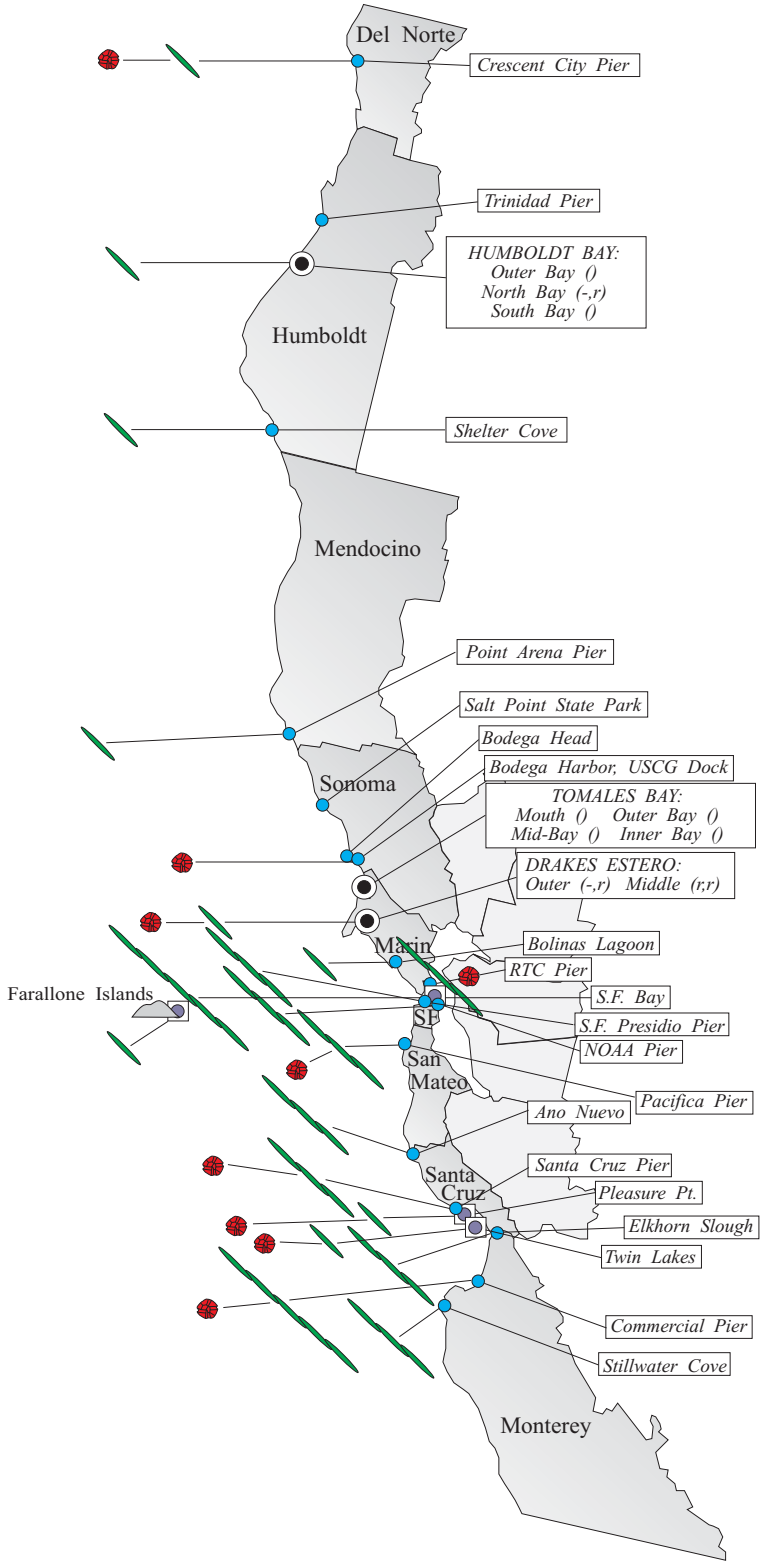
Alexandrium Species	Pseudo-nitzschia Species
Rare (less than 1%)	Present (less than 10%)
Present (between 1% and 10%)	Common (between 10% and 50%)
Common (between 10% and 50%)	Abundant (greater than 50%)
Abundant (greater than 50%)	

For areas with multiple sampling stations, species abundance at each station is represented as follows: (a,p) = Abundance for Alexandrium and Pseudo-nitzschia. e.g., (c,p) = common, present; (a,-) = abundant, not observed

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

Figure 2. Distribution of toxin-producing phytoplankton in Northern California during October, 2011.



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(Figure 1). The relative abundance of *Pseudo-nitzschia* decreased at some San Diego locations but remained high along the San Luis Obispo coast and offshore near Santa Cruz Island. The highest relative abundances were observed at several San Luis Obispo sites including offshore of Diablo Cove (October 28) and inside Morro Bay during the latter half of the month.

Elevated levels of domoic acid were detected in sentinel mussels from outer Morro Bay (21 ppm, October 31) and in lobster viscera from Santa Cruz Island (45 ppm, October 27) and San Nicolas Island (43 ppm, October 26). Lower concentrations of this toxin were also detected in shellfish from nearshore Santa Barbara and in lobster viscera from Santa Cruz and Catalina islands.

Non-toxic Species

Diatoms dominated the phytoplankton assemblage between San Luis Obispo and Santa Barbara. *Chaetoceros* was the most abundant genera. Dinoflagellates were more prevalent between Ventura and San Diego, with *Lingulodinium* common to abundant at a number of sites.

Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed in low numbers from numerous sites between Monterey and southern Sonoma County, as well as at

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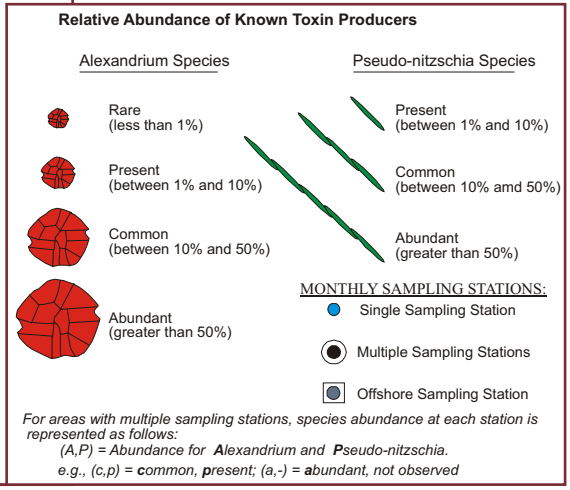
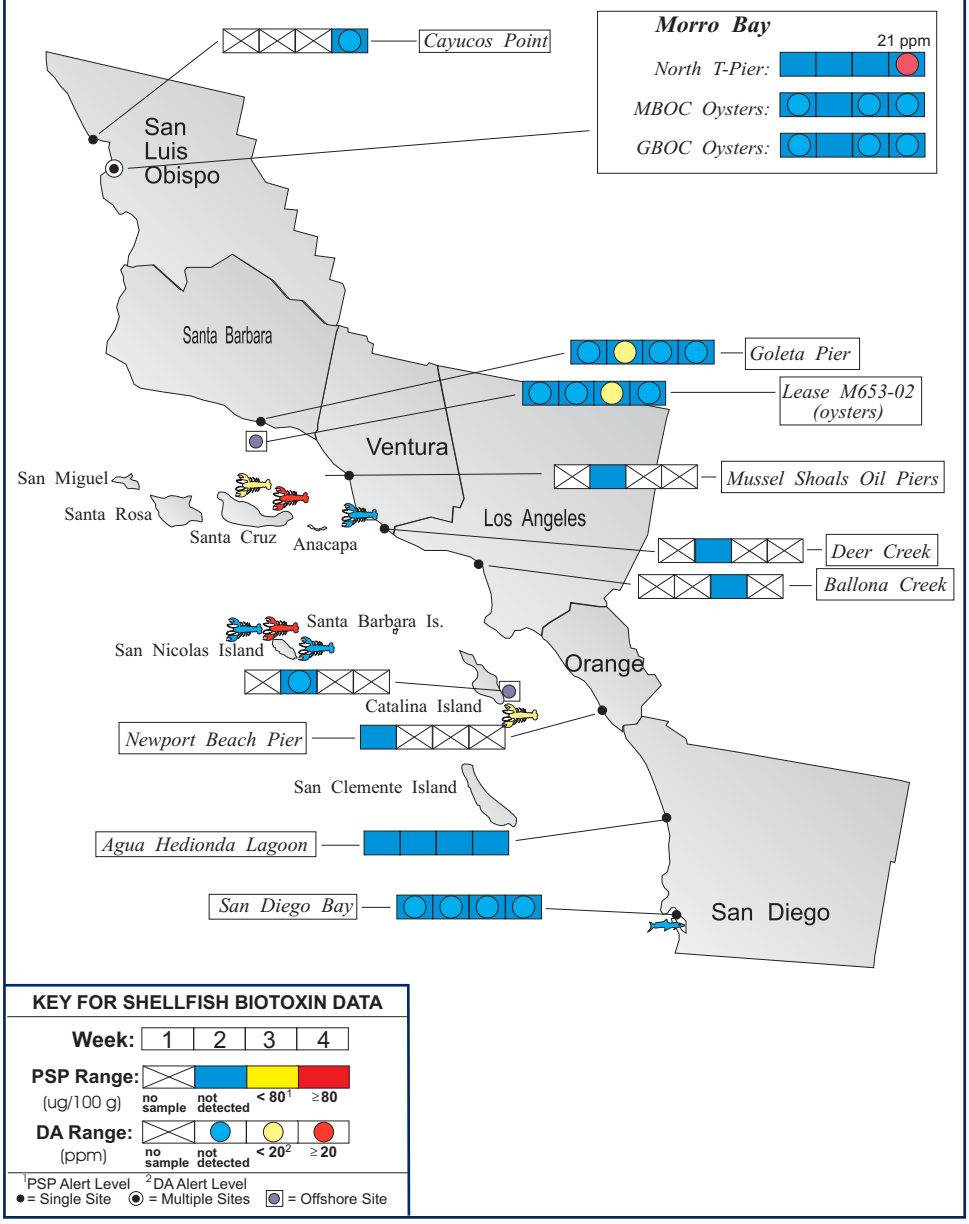


Figure 3. Distribution of shellfish biotoxins in Southern California during October, 2011.



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Crescent City in Del Norte County (Figure 2). The distribution of this dinoflagellate was similar to observations in September.

Low levels of PSP toxins persisted in sentinel mussels from Humboldt Bay and Santa Cruz Pier throughout the month (Figure 4). Low concentrations of these toxins were also detected in mussels from Trinidad Head (Humboldt County).

Domoic Acid

Pseudo-nitzschia was observed at most sites along the northern California coast during October (Figure 2). The relative abundance of this diatom declined along the Sonoma coast but increased between San Francisco and Monterey counties, as well as in Crescent City, compared to observations in September. The highest relative abundances were observed at Stillwater Cove (October 28), the Monterey Commercial Wharf (October 2 and 18), and at the entrance to Elkhorn Slough (October 29).

Domoic acid was not detected in any shellfish samples analyzed in October (Figure 4).

Non-toxic Species

The nontoxic dinoflagellate *Ceratium divaricatum* that was responsible for a

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The Marine Biotoxin Monitoring and Control Program, managed by the California Department of Public Health, is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins and domoic acid.

The Phytoplankton Monitoring Program is a state-wide effort designed to detect toxin producing species of phytoplankton in ocean water before they impact the public. The phytoplankton monitoring and observation effort can provide an advanced warning of a potential toxic bloom, allowing us to focus sampling efforts in the affected area before California's valuable shellfish resources or the public health is threatened.

For More Information Please Call:
(510) 412-4635

For Recorded Biotoxin Information Call:
(800) 553 - 4133

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second red tide along the Sonoma coast in September remained dominant along much of the northern California coast in October. This dinoflagellate was common to abundant between San Mateo and southern Humboldt counties. The highest relative abundances of *C. divaricatum* were observed at the Pt. Arena Pier (October 3, declining by October 19) and the Bodega Harbor sentinel station (October 28). High relative abundances were also detected inside Drakes Estero and San Francisco Bay. In contrast, the dinoflagellate *Prorocentrum* was abundant inside Monterey Bay and *Akashiwo sanguinea* was common at the Monterey Commercial Wharf. Diatoms were dominant along the Del Norte and Humboldt coast.

QUARANTINES:

The October 16 health advisory remained in effect, warning consumers not to eat sport-harvested shellfish or the internal organs of crustaceans and small finfish from the Channel Islands. Elevated levels of domoic acid continued to be detected in the viscera of lobster in this region.

The 2011 annual mussel quarantine ended at midnight on October 31. When in effect this quarantine prohibits the sport-harvesting of mussels along the entire California coastline, including all bays and estuaries. The annual quarantine does not apply to the certified

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Figure 4. Distribution of shellfish biotoxins in Northern California during October, 2011.

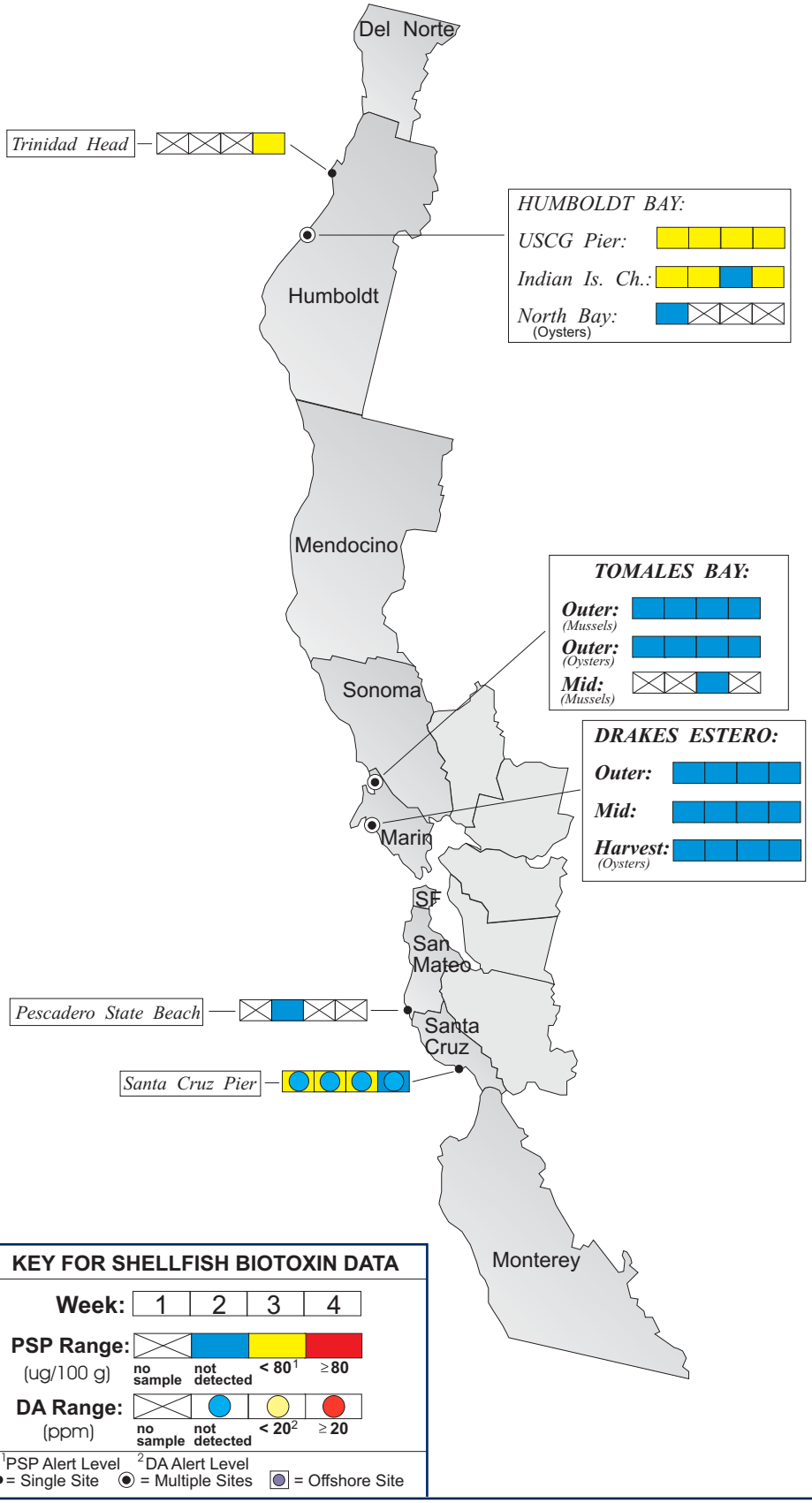

Table 1. California Marine Biotoxin Monitoring Program participants submitting shellfish samples during October, 2011.

COUNTY	AGENCY	#
Del Norte	Del Norte County Health Department	1
Humboldt	Coast Seafood Company	9
	Humboldt County Environmental Health Department	1
Mendocino	None Submitted	
Sonoma	None Submitted	
Marin	Cove Mussel Company	1
	Drakes Bay Oyster Company	16
	Hog Island Oyster Company	4
	Marin Oyster Company	5
San Francisco	None Submitted	
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	U.C. Santa Cruz	4
Monterey	None Submitted	
San Luis Obispo	Grassy Bar Oyster Co.	8
	Morro Bay Oyster Company	5
	CDPH Volunteer (*Otto Schmidt*)	1
Santa Barbara	Santa Barbara Mariculture Company	10
	U.C. Santa Barbara	4
	California Department of Fish and Game	2
Ventura	Ventura County Environmental Health Department	2
	California Department of Fish and Game (*SB office*)	3
	CDPH Volunteer (*Bill Weinerth*)	
Los Angeles	Los Angeles County Health Department	1
	CDPH Volunteer (*Cal Parsons*)	2
Orange	None Submitted	
San Diego	Carlsbad Aquafarms, Inc.	4
	U.S. Navy Marine Mammal Program	5

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commercial shellfish growing areas in California, which are monitored intensively throughout the year. In addition, routine coastal phytoplankton and biotoxin monitoring is maintained throughout the quarantine period. Special quarantines or health advisories may be issued for additional seafood species as warranted by increasing toxin levels.

Consumers of Washington clams, also known as butter clams (*Saxidomus nuttalli*), are cautioned to eat only the white meat. Washington clams can concentrate the PSP toxins in the viscera and in the dark parts of the siphon and can remain toxic for a long period of time. Persons taking scallops or clams, with the exception of razor clams, are advised to remove and discard the dark parts (i.e., the digestive organs or viscera). Razor clams (*Siliqua patula*) are an exception to this general guidance due to their ability to concentrate and retain domoic acid in the edible white meat as well as in the viscera.

PSP toxins affect the human central nervous system, producing a tingling around the mouth and fingertips within a few minutes to a few hours after eating toxic shellfish. These symptoms typically are followed by disturbed balance, lack of muscular coordination, slurred speech and difficulty swallowing. In severe poisonings, complete muscular paralysis and death from asphyxiation can occur.

Symptoms of domoic acid poisoning can occur within 30 minutes to 24 hours after eating toxic seafood. In mild cases, symptoms of exposure to this nerve toxin may include vomiting, diarrhea, abdominal cramps, headache and dizziness. These symptoms disappear completely within several days. In severe cases, the victim may experience excessive bronchial secretions, difficulty breathing, confusion, disorientation, cardiovascular instability, seizures, permanent loss of short-term memory, coma and death.

Any person experiencing any of these symptoms should seek immediate medical care. Consumers are also advised that neither cooking or freezing eliminates domoic acid or the PSP toxins from the shellfish tissue. These toxins may also accumulate in the viscera of other seafood species such as crab, lobster, and small finfish like sardines and anchovies, therefore these tissues should not be consumed. Contact the "Biotoxin Information Line" at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.

Table 2. Agencies, organizations and volunteers participating in marine phytoplankton sample collection during October, 2011.

COUNTY	AGENCY	#
Del Norte	Del Norte County Health Department	3
Humboldt	Coast Seafood Company	4
	Bureau of Land Management	1
Mendocino	CDPH Volunteer (*Marie de Santis*)	2
Sonoma	CDPH Marine Biotoxin Program	1
	California Department of Fish and Game	2
	CDPH Volunteer (*Cathleen Cannon*)	1
Marin	Drakes Bay Oyster Company	13
	CDPH Volunteer (*Brent Anderson*)	4
	SFSU, Romberg Tiburon Center	3
Contra Costa	None Submitted	
Alameda	None Submitted	
San Francisco	CDPH Volunteer (*Eugenia McNaughton*)	3
	Exploratorium	3
	San Francisco Bay Whale Watching Company	2
San Mateo	San Mateo County Environmental Health Department	1
	The Marine Mammal Center (*Stan Jensen*)	5
	U.C. Santa Cruz	2
Santa Cruz	California Department of Parks and Recreation	2
	U.C. Santa Cruz	4
Monterey	Monterey Abalone Company	5
	CDPH Volunteer (*Janis Chaffin*)	1
	Frineds of the Sea Otter (*Cory Utter*)	1
San Luis Obispo	Friends of the Sea Otter (*Kelly Cherry*)	8
	Grassy Bar Oyster Company	4
	Morro Bay National Estuary Program	1
	Monterey Bay National Marine Sanctuary	3
	Tenera Environmental	2
	The Marine Mammal Center (*P.J. Webb, Tim Lytsell*)	3
	CDPH Marine Biotoxin Program	1
Santa Barbara	CDPH Volunteer (*Sylvia Short*)	4
	Santa Barbara Mariculture Company	5
	U.C. Santa Barbara	4
	National Park Service	1
Ventura	CDPH Volunteer (*Fred Burgess*)	4
	National Park Service	1

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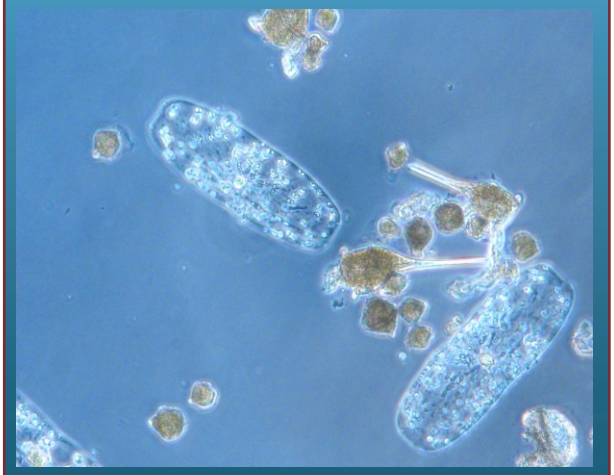
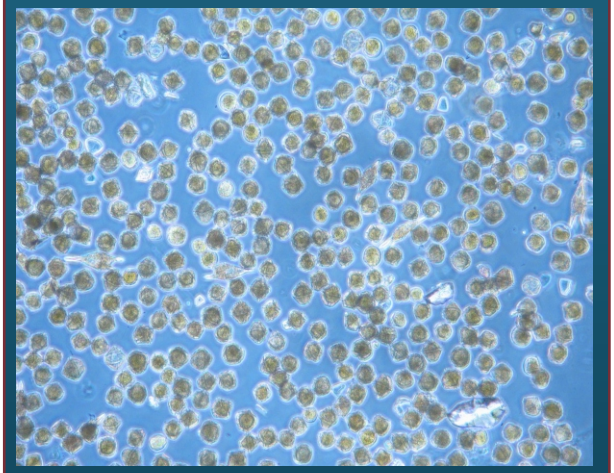
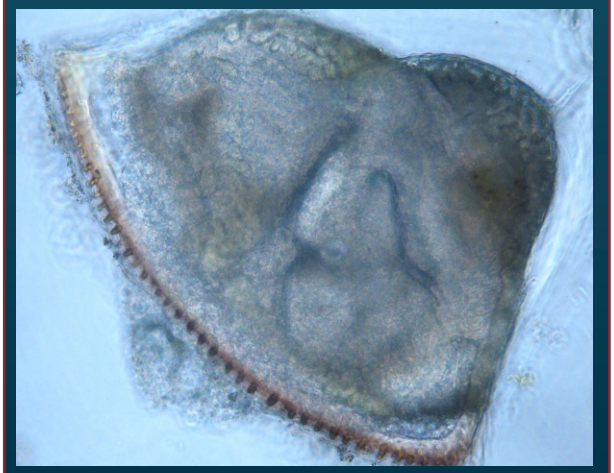
PHYTOPLANKTON GALLERY



The large diatom Tropidoneis is observed occasionally, usually in low numbers.



The dinoflagellate Lingulodinium was abundant at several southern California sites.



A rare find in our phytoplankton samples: a bryozoan cyphonaut larva.

A Look Back: Alexandrium, PSP Toxicity, and Red Tides during October 2003

Northern California Summary:

Paralytic Shellfish Poisoning

The relative abundance of *Alexandrium* increased throughout Northern California in October 2003. The highest relative abundances were detected at locations in Del Norte, Marin, and San Mateo counties.

Low concentrations of PSP toxins persisted in Humboldt Bay. Along the Mendocino coast the elevated level of PSP toxins detected in September (1600 ug) declined but remained above the alert level by the end of October (147 ug). In Marin there was a significant increase in PSP toxin concentration in mussels at the Drakes Bay sentinel station, reaching 153 ug. Toxin levels also increased inside Drakes Estero, with concentrations reaching 209 ug and 334 ug in mussels in the outer and mid estero, respectively.

Southern California Summary:

Non-toxic Bloom: Red Tide Continues

Extensive dinoflagellate blooms continued through October 2003, creating massive "red tides" along the Southern California coast. *Lingolodinium polyedrum* was abundant along the entire coastline from San Luis Obispo through San Diego. This dinoflagellate comprised between 90 to 99% of the species present in these areas. The greatest densities were observed at sites in Los Angeles and San Diego counties. Divers from the San Diego region reported the thickness of the bloom to extend at least 50 feet in depth at some locations. This spectacular event continued throughout the month, resulting in incredible displays of bioluminescence at night.

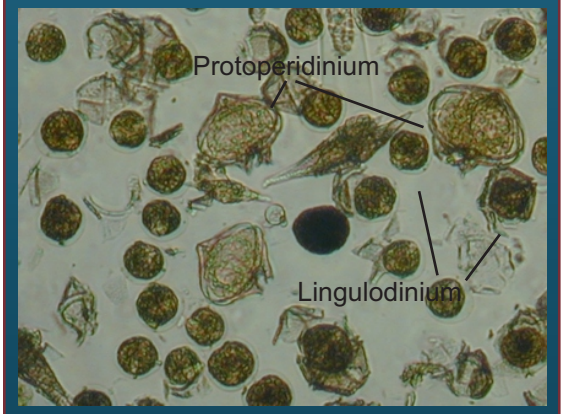
Table 2 continued (from Page 6).

COUNTY	AGENCY	#
Los Angeles	Los Angeles County Sanitation District	2
	Catalina Island Martine Institute	2
	CDPH Volunteer (*Cal Parsons*)	1
	Southern California Marine Institute	1
	Tole Mour	5
Orange	Orange County Sanitation District	3
	Ocean Institute	1
	California Department of Fish and Game	1
San Diego	Carlsbad Aquafarms, Inc.	3
	Scripps Institute of Oceanography	5
	San Diego Whale Watching	2
	Tijuana River National Estuary Research Reserve	2
	U.S. Navy Marine Mammal Program	3

PHYTOPLANKTON GALLERY

October 2003 Observations

The PSP toxin producing dinoflagellate Alexandrium catenella increased along the Northern California coast during October 2003.



The "red tide" dinoflagellate Lingulodinium was abundant along the Southern California coast. Cell walls can be seen on vegetative cells; the dark, dense, smoother bodies are resting cysts.

Despite the dominance of the red tide dinoflagellate along the Southern California coast, diatoms were still present offshore. The delicate Bacteriastrum was common in samples from Catalina Island in October.